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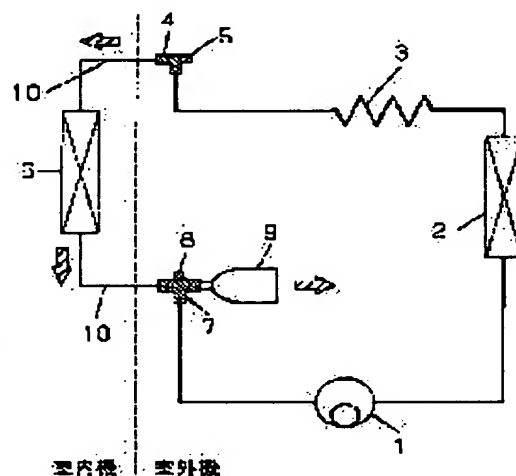
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(54) METHOD FOR CONSTRUCTION OF AIR CONDITIONER

(57)Abstract:

PROBLEM TO BE SOLVED: To execute a simple method for construction of an air conditioner in consideration of an effect on an environment by a method wherein the air in an indoor machine and a connection piping is purged selectively from inside the air conditioner by utilizing a gas permeation function of a membrane.

SOLUTION: An indoor machine 6 and an outdoor machine 2 are connected by an indoor-outdoor connection piping 10, and a jig 9 equipped with a gas permeation membrane (polyimide) is fitted to a gas-side three-way valve 7 of the outdoor machine 2. By opening a screw part 9 of the gas-side three-way valve 7 and by opening a screw part 5 of a liquid-side two-way valve 4 subsequently, a refrigerant in the main body of the outdoor machine 2 is introduced into the connection piping and the indoor machine 6, while the pressure in a system rises. Since the gas permeation membrane has a characteristic of making air permeate selectively more than the refrigerant, the air in the indoor machine 6 and the connection piping is released into the atmosphere selectively through the gas permeation membrane, being facilitated by a partial pressure difference between the internal pressure having risen and the outside and by gas permeation selectivity.



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CLAIMS

[Claim(s)]

[Claim 1] The construction approach of the air conditioner characterized by introducing the refrigerant gas in said exterior unit into said interior unit and connecting piping, and making the air in said interior unit and connecting piping discharge through gas permeation membrane after attaching the fixture which comes to provide gas permeation membrane in the case of installation work in the air conditioner which connects and constitutes an interior unit, an exterior unit, and both using connecting piping.

[Claim 2] In the air conditioner which connects and constitutes an interior unit, an exterior unit, and both using connecting piping, and equips at least one side by the side of the liquid of said exterior unit, or gas with the method valve of three After attaching the fixture which possesses gas permeation membrane to said method valve of three on the occasion of installation work, the refrigerant gas in said exterior unit is introduced into said interior unit and connecting piping. The construction approach of the air conditioner characterized by making the air in said interior unit and connecting piping discharge through the fixture attached in said method valve of three.

[Claim 3] In the air conditioner which connects and constitutes an interior unit, an exterior unit, and both using connecting piping, equips either the liquid side of said exterior unit, or a gas side with the method valve of three, and equips another side with the method valve of two A carbon dioxide or hydrocarbon gas is introduced into said interior unit and connecting piping from said method valve of three in the case of installation work. Atmospheric-air emission of the air in said interior unit and connecting piping is carried out from said method valve this side of two. After attaching the fixture which possesses gas permeation membrane to said method valve of three after permuting by said carbon dioxide or hydrocarbon gas, the refrigerant gas in said exterior unit is introduced into an interior unit and connecting piping. The construction approach of the air conditioner characterized by making the carbon dioxide or hydrocarbon gas permuted through said attached fixture discharge.

[Claim 4] In the air conditioner which an interior unit, an exterior unit, and both are connected and constituted using connecting piping, and both liquid [of said exterior unit] and gas sides equip with the method valve of three A carbon dioxide or hydrocarbon gas is introduced into said interior unit and connecting piping from one of the 1st method valves of three a liquid or gas side in the case of installation work. Atmospheric-air emission of the air in said interior unit and connecting piping is carried out from the 2nd method valve of three of another side. After attaching the fixture which possesses gas permeation membrane to said 2nd method valve of three after permuting by said carbon dioxide or hydrocarbon gas, the refrigerant gas in said exterior unit is introduced into said interior unit and connecting piping. The construction approach of the air conditioner characterized by making the carbon dioxide or hydrocarbon gas permuted through said attached fixture discharge.

[Claim 5] The construction approach of an air conditioner given in claim 1 characterized by gas permeation membrane consisting of polyimide film or water gel film - 4 any 1 terms.

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DETAILED DESCRIPTION

[Detailed Description of the Invention]

[0001]

[Field of the Invention] This invention relates to the construction approach of a separate mold air conditioner to which an interior unit and an exterior unit are joined in connecting piping.

[0002]

[Description of the Prior Art] The conventional air-conditioner construction approach filled up the body of an exterior unit with the refrigerant gas as an object for air purging too much than the amount of conventions, carried out air purging of the interior unit to connecting piping from the method valve of liquid side 2 using the refrigerant, from the bulb called the service port of the method valve of gas side 3, carried out atmospheric-air emission and was performing the refrigerant.

[0003] Moreover, after fully decompressing the inside of connecting piping and an interior unit using a vacuum pump from the bulb called the service port of the method valve of gas side 3, it was carrying out by introducing a refrigerant into connecting piping and an interior unit from the method valve of liquid side 2.

[0004]

[Problem(s) to be Solved by the Invention] However, it is a problem to carry out atmospheric-air emission of the high refrigerant of ozone depletion potential and a global warming potential by the upsurge of regulations on an environment, such as destruction of an ozone layer and global warming, in recent years at the time of installation of a vacant lot rotary condenser. Although the construction approach which used the vacuum pump as an approach of replacing with it is guided, on the bad conditions of the installation of roof superiors, use of a vacuum pump is rather difficult, for example. Moreover, the vacuum pump use method had required time amount for installation compared with the method which uses the refrigerant of an exterior unit.

[0005] This invention aims at offering the construction approach of a simple air conditioner in consideration of the effect on an environment in view of the above-mentioned conventional trouble.

[0006]

[Means for Solving the Problem] Since it introduces the refrigerant gas in an exterior unit into an interior unit and connecting piping and makes the air in an interior unit and connecting piping discharge from the air-conditioning inside of a plane alternatively using membranous gas segregation after this invention attaches the fixture which comes to provide gas permeation membrane in the case of installation work in order to solve the above-mentioned technical problem, most refrigerants are not discharged.

[0007] Moreover, since the permutation gas which exists in an interior unit and connecting piping by the refrigerant gas in an exterior unit is permuted by the refrigerant gas and permutation gas is made to discharge alternatively through the attached gas permeation membrane once a carbon dioxide or hydrocarbon gas permutes the air in an interior unit and connecting piping, it remains for carrying out atmospheric-air emission of the small permutation gas of ozone depletion potential and a global warming potential.

[0008]

[Embodiment of the Invention] In the air conditioner which connects and constitutes an interior unit, an exterior unit, and both using connecting piping, invention according to claim 1 for solving the above-mentioned technical problem can perform air-purging construction of an air conditioner by introducing the refrigerant gas in an exterior unit into an interior unit and connecting piping, and discharging the air in an interior unit and connecting piping through gas permeation membrane, after attaching the fixture which comes to provide gas permeation membrane in the case of installation work.

[0009] In the air conditioner by which invention according to claim 2 equips at least one side by the side of the liquid of an exterior unit, or gas with the method valve of three concretely After attaching the fixture which possesses gas permeation membrane to the method valve of three on the occasion of installation work, air-purging construction of an air conditioner can be performed by introducing the refrigerant gas in an exterior unit into an interior unit and connecting piping, and discharging through the fixture which

attached the air in an interior unit and connecting piping in the method valve of three.

[0010] In the air conditioner which invention according to claim 3 equips either the liquid side of an exterior unit, or a gas side with the method valve of three, and equips another side with the method valve of two A carbon dioxide or hydrocarbon gas is introduced into an interior unit and connecting piping from the method valve of three in the case of installation work. After attaching the fixture which possesses gas permeation membrane to said method valve of three after carrying out atmospheric-air emission of the air in an interior unit and connecting piping from the method valve this side of two, the refrigerant gas in an exterior unit is introduced into an interior unit and connecting piping. Air-purging construction of an air conditioner can be performed by discharging a carbon dioxide or hydrocarbon gas through the attached fixture.

[0011] In the air conditioner which, as for both invention according to claim 4, a liquid [of an exterior unit] and gas side equips with the method valve of three A carbon dioxide or hydrocarbon gas is first introduced into an interior unit and connecting piping from one of the method valves A of three a liquid or gas side in the case of installation work. Once it carries out atmospheric-air emission of the air from the method valve B of three of another side and a carbon dioxide or hydrocarbon gas permutes the inside of an interior unit and connecting piping, After attaching the fixture which comes to provide gas permeation membrane to the method valve B of three of another side, the refrigerant gas in an exterior unit is introduced into an interior unit and connecting piping, and air-purging construction of an air conditioner can be performed by discharging through the fixture which attached an interior unit and the permutation gas in connecting piping in the method valve B of three of another side.

[0012] Moreover, invention according to claim 5 can perform air-purging construction of the air conditioner which was excellent in using what consists of polyimide film or water gel film as gas permeation membrane at gas segregation.

[0013]

[Example] Hereafter, the example of this invention is explained with reference to a drawing.

[0014] (Example 1) Drawing 1 is the 1st and an air conditioner which shows the example of invention of two. For a compressor and 2, as for an collimator and 4, an outdoor heat exchanger and 3 are [one / the method valve of liquid side 2, the fixture with which in the screw section of the method valve of two and 6 the method valve of gas side 3 and 8 possessed the screw section of the method valve of three, and, as for 9, indoor heat exchanger and 7 possess / 5 / gas permeation membrane, and 10] inside-and-outside connecting piping among drawing, and the component part of 7 and 8 is built in the exterior unit as 1-5. Moreover, the interior unit expresses with the indoor heat exchanger 6 of a component part.

[0015] After attaching now the fixture 9 which connected the interior unit and the exterior unit by inside-and-outside connecting piping 10, and possesses gas permeation membrane (polyimide) to the method valve 7 of gas side 3 of an exterior unit, By opening the screw section 9 of the method valve 7 of gas side 3, and then opening gradually the screw section 5 of the method valve 4 of liquid side 2, while the refrigerant in the body of an exterior unit is introduced into connecting piping and an interior unit, the pressure in a system rises. Since gas permeation membrane has the property of making air (nitrogen, oxygen) penetrating alternatively rather than a refrigerant, the air in an interior unit and a communication trunk is promoted by the partial pressure difference and gas discontinuous-selection nature of the internal pressure and the exterior which went up, and atmospheric-air emission is alternatively carried out through gas permeation membrane. Moreover, the screw section 5 of the method valve 4 of liquid side 2 may be opened, and the screw section 8 of the method valve 7 of gas side 3 may be opened.

[0016] In the 1st invention, especially the mounting arrangement of the fixture possessing gas permeation membrane is not limited. Therefore, the fixture which installed and sometimes possesses gas permeation membrane with a removable gestalt is attached, and all the air-purging methods using the pressure which a refrigerant has, and gas discontinuous-selection nature are contained. Moreover, in the 2nd invention, although the method valve of two was shown in one side and the example of the method valve of three was shown in another side in the example 1, also when both are the method valves of three, it is contained in this invention.

[0017] (Example 2) Drawing 2 shows the air conditioner of the example of the 3rd invention. In 11, a compressor and 12 among drawing an collimator and 14 for an outdoor heat exchanger and 13 The method valve of liquid side 2, 15 indoor heat exchanger and 17 for the screw section of the method valve of two, and 16 The method valve of gas side 3, For the fixture with which 18 possessed the screw section of the method valve of three, and 19 possesses gas permeation membrane (water gel), and 20, as for a carbon-dioxide bomb and 22, the bulb for fixtures 19 and 21 are [the bulb for carbon-dioxide bombs and 23] inside-and-outside connecting piping, and the component part of 17 and 18 is built in the exterior unit as

11-15. Moreover, the interior unit expresses with the indoor heat exchanger 16 of a component part. [0018] After attaching the carbon-dioxide bomb 21 through the fixture 19 possessing the gas permeation membrane which connected the interior unit and the exterior unit by inside-and-outside connecting piping 23, and minded [of the exterior unit / method / of gas side 3 / 17] the bulb 20, and a bulb 22, After loosening lightly the splice nut of the method valve 14 of liquid side 2, and connecting piping 23 first, if the screw section 18 of the method valve 17 of gas side 3 is opened and then a bulb 22 is opened, a carbon dioxide will be introduced into inside-and-outside connecting piping 23 and an interior unit from the carbon-dioxide bomb 21. After making a bulb 22 open and close 2 to 3 times and fully performing the permutation of air and a carbon dioxide at this time, the splice nut which loosened the point is bound tight like origin, and a bulb 22 is also closed. Next, if the screw section of the method valve 14 of liquid side 2 is opened after opening a bulb 20, a refrigerant will be introduced from the body of an exterior unit into inside-and-outside connecting piping 23 and an interior unit. The pressure in a system rises after that. Since gas permeation membrane has the property of making a carbon dioxide penetrating alternatively rather than a refrigerant, the carbon dioxide in an interior unit and a communication trunk is promoted by the partial pressure difference and gas discontinuous-selection nature of the internal pressure and the exterior which went up, and atmospheric-air emission is alternatively carried out through gas permeation membrane.

[0019] (Example 3) Drawing 3 shows the air conditioner of the example of the 4th invention. In 24, a compressor and 25 among drawing an collimator and 27 for an outdoor heat exchanger and 26 The method valve of liquid side 3, 28 a carbon-dioxide bomb and 30 for the screw section of the method valve of liquid side 3, and 29 The bulb for carbon-dioxide bombs, As for the fixture with which in 31 the method valve of gas side 3 and 33 possessed the screw section of the method valve of gas side 3, and, as for 34, indoor heat exchanger and 32 possess gas permeation membrane, and 35, the bulb for fixtures 34 and 36 are inside-and-outside connecting piping, and the component part of 32 and 33 is built in the exterior unit as 24-28. Moreover, the interior unit expresses with the indoor heat exchanger 31 of a component part.

[0020] After connecting an interior unit and an exterior unit by inside-and-outside connecting piping 36 and attaching the carbon-dioxide bomb 29 in the method valve 27 of liquid side 3 of an exterior unit through a bulb 30, after opening the screw section 28 of the method valve 27 of liquid side 3 first, a bulb 30 is opened, a carbon dioxide is introduced into inside-and-outside connecting piping 36 and an interior unit, and internal pressure rises. Internal pressure is 2-5kg/cm². A bulb 30 is closed in the place considered to have reached, inside-and-outside connecting piping 36, the air in an interior unit, and the mixture of gas of a carbon dioxide are discharged from the port (the fixture 34 possessing a bulb 35 and gas permeation membrane is attached, and it is a front condition) of the method valve 32 of gas side 3, and it considers as an atmospheric pressure condition. next -- since it is alike again, a bulb 30 is opened, a carbon dioxide is introduced into inside-and-outside connecting piping 36 and an interior unit and internal pressure rises -- internal pressure -- 2-5kg/cm² A bulb 30 is closed in the place considered to have reached, inside-and-outside connecting piping 36, the air in an interior unit, and the mixture of gas of a carbon dioxide are discharged from the port of the method valve 32 of gas side 3, and it considers as an atmospheric pressure condition. The inside of inside-and-outside connecting piping 36 and an interior unit will be in the condition of the choke damp nearly completely by repeating this actuation 3 or 4 times. Then, both the carbon-dioxide bombs 29 to which the bulb 30 was attached are removed, after attaching in the port of the method valve 32 of gas side 3 the fixture 34 which possesses gas permeation membrane with a bulb 35, the screw section 28 of the method valve 27 of liquid side 3 is opened, and a refrigerant is introduced inside-and-outside connecting piping 36 and into an interior unit from the body of an exterior unit. The pressure in a system rises after that. Since gas permeation membrane has the property of making a carbon dioxide penetrating alternatively rather than a refrigerant, the carbon dioxide in an interior unit and a communication trunk is promoted by the partial pressure difference and gas discontinuous-selection nature of the internal pressure and the exterior which went up, and atmospheric-air emission is alternatively carried out through gas permeation membrane.

[0021] Although the choke damp was used and the air permutation in inside-and-outside connecting piping and an interior unit was performed in the examples 2 and 3, in this invention, in addition to this, the hydrocarbon gas of a low-boiling point may be used, for example, methane, ethane, a propane, an isobutane, etc. can be used.

[0022] Although the polyimide film was used in the example 1 and the water gel film was used in the examples 2 and 3 as gas permeation membrane, application limitation is not carried out especially on the occasion of use. However, the thing applicable to this invention was the polyimide film or the water gel film as film which has the outstanding gas isolation. Moreover, the water gel film is vinyl alcohol-acrylate

copolymer film which has the structure of cross linkage, and it is used for it, making this absorb a gas carrier water solution. Moreover, it is desirable that it is the porous body of the shape of the shape of a flat film and a hollow filament as a gestalt.

[0023]

[Effect of the Invention] In the air conditioner which connects and constitutes an interior unit, an exterior unit, and both using connecting piping, after invention of claim 1 and two publications attached the fixture which comes to provide gas permeation membrane in the case of installation work, it introduced the refrigerant gas in an exterior unit into an interior unit and connecting piping, does not discharge the air in an interior unit and connecting piping through gas permeation membrane, and hardly carried out atmospheric-air emission of the refrigerant, so that clearly from the above-mentioned example.

[0024] Moreover, once invention of claim 3 and four publications permuted the air in an interior unit and connecting piping by the carbon dioxide or hydrocarbon gas, the refrigerant gas in an exterior unit was introduced into an interior unit and connecting piping, an interior unit and the permutation gas in connecting piping are discharged through gas permeation membrane, and carrying out atmospheric-air emission was stopped by the small permutation gas of ozone modulus of rupture and a warming multiplier rather than the refrigerant.

[0025] Moreover, invention according to claim 5 chooses the polyimide film or the water gel film as gas permeation membrane, and the outstanding gas selectivity was acquired.

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DESCRIPTION OF DRAWINGS

[Brief Description of the Drawings]

[Drawing 1] The construction approach block diagram of the air conditioner performed according to the example 1 of this invention

[Drawing 2] The construction approach block diagram of the air conditioner performed according to the example 2 of this invention

[Drawing 3] The construction approach block diagram of the air conditioner performed according to the example 3 of this invention

[Description of Notations]

1 Compressor

2 Outdoor Heat Exchange Machine

3 Collimator

4 Method Valve of Liquid Side 2

5 Screw Section of Method Valve of Liquid Side 2

6 Indoor Heat Exchange Machine

7 Method Valve of Gas Side 3

8 Screw Section of Method Valve of Gas Side 3

9 Fixture Possessing Gas Permeation Membrane

10 Inside-and-Outside Connecting Piping

11 Compressor

12 Outdoor Heat Exchange Machine

13 Collimator

14 Method Valve of Liquid Side 2

15 Screw Section of Method Valve of Liquid Side 2

16 Indoor Heat Exchange Machine
 17 Method Valve of Gas Side 3
 18 Screw Section of Method Valve of Gas Side 3
 19 Fixture Possessing Gas Permeation Membrane
 20 Bulb
 21 Carbon-Dioxide Bomb
 22 Bulb
 23 Inside-and-Outside Connecting Piping
 24 Compressor
 25 Outdoor Heat Exchange Machine
 26 Collimator
 27 Method Valve of Liquid Side 3
 28 Screw Section of Method Valve of Liquid Side 3
 29 Carbon-Dioxide Bomb
 30 Bulb
 31 Indoor Heat Exchange Machine
 32 Method Valve of Gas Side 3
 33 Screw Section of Method Valve of Gas Side 3
 34 Fixture Possessing Gas Permeation Membrane
 35 Bulb
 36 Inside-and-Outside Connecting Piping

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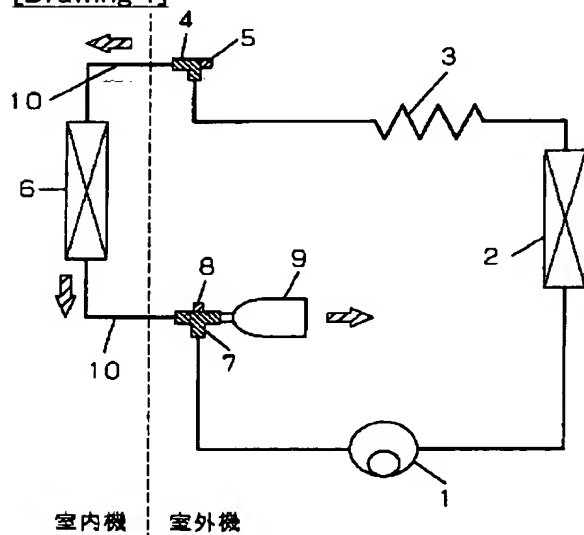
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DRAWINGS

[Drawing 1]



[Drawing 2]

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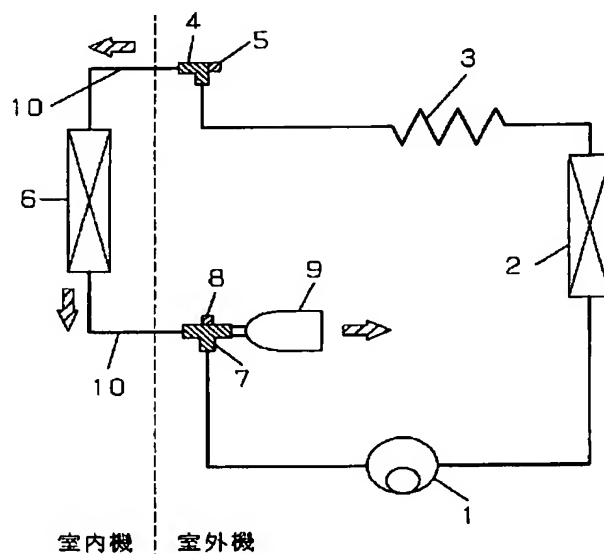
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(54) 【発明の名称】 空気調和機の施工方法

(57) 【要約】

【課題】 セバレート型空気調和機を施工する時に、エアバージを冷媒ガスを使用して行くと冷媒の大気放出となり、環境への影響が好ましくなかった。

【解決手段】 気体分離膜を具備してなる治具9を取り付けて、室内機6および接続配管10中の空気を気体分離膜を介して排出する。室内機および接続配管中の空気を一旦二酸化炭素あるいは炭化水素ガスでバージした後、気体分離膜を具備してなる治具を取り付けて、室内機および接続配管中の置換ガスを気体分離膜を介して排出する。気体分離膜がポリイミド膜、含水ゲル膜からなる。



【特許請求の範囲】

【請求項1】 室内機と室外機と両者を接続配管を用いて接続して構成する空気調和機において、据え付け工事の際に気体分離膜を具備してなる治具を取り付けた後、前記室外機中の冷媒ガスを前記室内機および接続配管中に導入して、前記室内機および接続配管中の空気を気体分離膜を介して排出させることを特徴とする空気調和機の施工方法。

【請求項2】 室内機と室外機と両者を接続配管を用いて接続して構成し、前記室外機の液側あるいはガス側の少なくとも一方に3方弁を装備する空気調和機において、据え付け工事の際に前記3方弁に気体分離膜を具備した治具を取り付けた後、前記室外機中の冷媒ガスを前記室内機および接続配管中に導入して、前記室内機および接続配管中の空気を前記3方弁に取り付けた治具を介して排出させることを特徴とする空気調和機の施工方法。

【請求項3】 室内機と室外機と両者を接続配管を用いて接続して構成し、前記室外機の液側およびガス側のどちらかに3方弁を装備し、もう一方に2方弁を装備する空気調和機において、据え付け工事の際に前記3方弁から二酸化炭素あるいは炭化水素ガスを前記室内機および接続配管中に導入し、前記室内機および接続配管中の空気を前記2方弁手前から大気放出し、前記二酸化炭素あるいは炭化水素ガスと置換した後、前記3方弁に気体分離膜を具備した治具を取り付けた後、前記室外機中の冷媒ガスを室内機および接続配管中に導入して、前記取り付け付けた治具を介して置換された二酸化炭素あるいは炭化水素ガスを排出させることを特徴とする空気調和機の施工方法。

【請求項4】 室内機と室外機と両者を接続配管を用いて接続して構成し、前記室外機の液側およびガス側がともに3方弁を装備する空気調和機において、据え付け工事の際に液側あるいはガス側どちらか一方の第1の3方弁から二酸化炭素あるいは炭化水素ガスを前記室内機および接続配管中に導入して、前記室内機および接続配管中の空気を他方の第2の3方弁から大気放出し、前記二酸化炭素あるいは炭化水素ガスと置換した後、前記第2の3方弁に気体分離膜を具備した治具を取り付けた後、前記室外機中の冷媒ガスを前記室内機および接続配管中に導入して、前記取り付け付けた治具を介して置換された二酸化炭素あるいは炭化水素ガスを排出させることを特徴とする空気調和機の施工方法。

【請求項5】 気体分離膜がポリイミド膜あるいは含水ゲル膜からなることを特徴とする請求項1～4いずれか一項に記載の空気調和機の施工方法。

【発明の詳細な説明】

【0001】

【発明の属する技術分野】本発明は、接続配管にて室内機と室外機を接合させるセパレート型空気調和機の施工

方法に関する。

【0002】

【従来の技術】従来の空気調和機施工方法は、室外機本体にエアバージ用として冷媒ガスを規定量よりも余分に充填し、その冷媒を利用して液側2方弁から接続配管と室内機をエアバージし、ガス側3方弁のサービスポートと呼ばれるバルブより冷媒を大気放出して行っていた。

【0003】また、ガス側3方弁のサービスポートと呼ばれるバルブより真空ポンプを使用して接続配管と室内機中を十分に減圧した後、液側2方弁から冷媒を接続配管と室内機に導入することによって行っていた。

【0004】

【発明が解決しようとする課題】しかしながら、近年オゾン層の破壊、地球温暖化など環境に対する規制の高揚により空地調和機の設置時にオゾン層破壊係数、地球温暖化係数の高い冷媒を大気放出することは問題である。それに代わり得る方法として真空ポンプを使用した施工方法を指導しているが、たとえば屋根上等の設置場所の悪い条件ではなかなか真空ポンプの利用は困難である。また、真空ポンプ使用方式は室外機の冷媒を使用する方式に比べて設置に時間がかかっていた。

【0005】本発明は、上記従来の問題点を鑑みて、環境への影響を考慮し、簡易な空気調和機の施工方法を提供することを目的とする。

【0006】

【課題を解決するための手段】上記課題を解決するために本発明は、据え付け工事の際に気体分離膜を具備してなる治具を取り付けた後、室外機中の冷媒ガスを室内機および接続配管中に導入して、膜の気体分離作用を利用して室内機および接続配管中の空気を選択的に空気調和機内から排出させるので、冷媒はほとんど排出されない。

【0007】また、一旦二酸化炭素あるいは炭化水素ガスで室内機および接続配管中の空気を置換した後、室外機中の冷媒ガスで室内機および接続配管中に存在する置換ガスを冷媒ガスと置換し、置換ガスは取り付け付けた気体分離膜を介して選択的に排出させるので、オゾン層破壊係数、地球温暖化係数の小さな置換ガスを大気放出するにとどまる。

【0008】

【発明の実施の形態】上記の課題を解決するための請求項1記載の発明は、室内機と室外機と両者を接続配管を用いて接続して構成する空気調和機において、据え付け工事の際に気体分離膜を具備してなる治具を取り付けた後、室外機中の冷媒ガスを室内機および接続配管中に導入して、室内機および接続配管中の空気を気体分離膜を介して排出することで空気調和機のエアバージ施工ができる。

【0009】請求項2記載の発明は、具体的に室外機の液側あるいはガス側の少なくとも一方に3方弁を装備す

る空気調和機において、据え付け工事の際に3方弁に気体分離膜を具備した治具を取り付けた後、室外機中の冷媒ガスを室内機および接続配管中に導入して、室内機および接続配管中の空気を3方弁に取り付けた治具を介して排出することで空気調和機のエアバージ施工ができる。

【0010】請求項3記載の発明は、室外機の液側およびガス側のどちらかに3方弁を装備し、もう一方に2方弁を装備する空気調和機において、据え付け工事の際に3方弁から二酸化炭素あるいは炭化水素ガスを室内機および接続配管中に導入し、室内機および接続配管中の空気を2方弁手前から大気放出した後、前記3方弁に気体分離膜を具備した治具を取り付けた後、室外機中の冷媒ガスを室内機および接続配管中に導入して、取り付けた治具を介して二酸化炭素あるいは炭化水素ガスを排出することで空気調和機のエアバージ施工ができる。

【0011】請求項4記載の発明は、室外機の液側およびガス側がともに3方弁を装備する空気調和機において、据え付け工事の際にまず液側あるいはガス側どちらか一方の3方弁Aから二酸化炭素あるいは炭化水素ガスを室内機および接続配管中に導入し、他方の3方弁Bから空気を大気放出させ、一旦二酸化炭素あるいは炭化水素ガスで室内機および接続配管中を置換した後、他方の3方弁Bに気体分離膜を具備してなる治具を取り付けた後、室外機中の冷媒ガスを室内機および接続配管中に導入し、室内機および接続配管中の置換ガスを他方の3方弁Bに取り付けた治具を介して排出することで空気調和機のエアバージ施工ができる。

【0012】また請求項5記載の発明は、気体分離膜としてポリイミド膜あるいは含水ゲル膜から構成されるものを使用することで気体分離作用に優れた空気調和機のエアバージ施工ができる。

【0013】

【実施例】以下、本発明の実施例について図面を参照して説明する。

【0014】（実施例1）図1は、第1、2の発明の実施例を示す空気調和機である。図中、1は圧縮機、2は室外熱交換器、3は絞り装置、4は液側2方弁、5は2方弁のネジ部、6は室内熱交換器、7はガス側3方弁、8は3方弁のネジ部、9は気体分離膜を具備した治具、10は内外接続配管で、1～5と7、8の構成部品は室外機に内蔵されている。また、室内機は構成部品の室内熱交換器6にて表している。

【0015】いま、室内機と室外機を内外接続配管10にて接続し、室外機のガス側3方弁7に気体分離膜（ポリイミド）を具備した治具9を取り付けた後、ガス側3方弁7のネジ部9を開き、次に液側2方弁4のネジ部5を徐々に開くことによって、室外機本体中の冷媒は接続配管および室内機中に導入されるとともに系内の圧力が上昇する。気体分離膜は冷媒よりも空気（窒素、酸素）

を選択的に透過させる特性を有するために、室内機および接続管内の空気は上昇した内部圧力と外部との分圧差および気体分離選択性に促進されて気体分離膜を介して選択的に大気放出される。また、液側2方弁4のネジ部5を開き、ガス側3方弁7のネジ部8を開いてもよい。

【0016】第1の発明では、気体分離膜を具備した治具の取り付け方法は特に限定されるものではない。したがって、据え付け時に着脱可能な形態で気体分離膜を具備した治具を取り付けて、冷媒が有する圧力と気体分離選択性とを利用したエアバージ方式は全て含まれる。また、第2の発明では、実施例1において一方に2方弁、他方に3方弁の例を示したが、両方が3方弁の場合も本発明に含まれる。

【0017】（実施例2）図2は、第3の発明の実施例の空気調和機を示す。図中、11は圧縮機、12は室外熱交換器、13は絞り装置、14は液側2方弁、15は2方弁のネジ部、16は室内熱交換器、17はガス側3方弁、18は3方弁のネジ部、19は気体分離膜（含水ゲル）を具備した治具、20は治具19用バルブ、21は二酸化炭素ポンプ、22は二酸化炭素ポンプ用バルブ、23は内外接続配管で、11～15と17、18の構成部品は室外機に内蔵されている。また、室内機は構成部品の室内熱交換器16にて表している。

【0018】室内機と室外機を内外接続配管23にて接続し、室外機のガス側3方弁17にバルブ20を介した気体分離膜を具備した治具19とバルブ22を介した二酸化炭素ポンプ21を取り付けた後、まず液側2方弁14と接続配管23との継ぎ手ナットを軽く緩めた後、ガス側3方弁17のネジ部18を開き、次にバルブ22を開くと二酸化炭素ポンプ21から二酸化炭素が内外接続配管23と室内機中に導入される。この時、バルブ22を2～3回開閉させて十分に空気と二酸化炭素との置換を行った後、先ほど緩めた継ぎ手ナットを元のように締め付け、バルブ22も閉じる。次にバルブ20を開いてから液側2方弁14のネジ部を開くと、内外接続配管23と室内機中に冷媒が室外機本体より導入される。その後系内の圧力は上昇する。気体分離膜は冷媒よりも二酸化炭素を選択的に透過させる特性を有するために、室内機および接続管内の二酸化炭素は上昇した内部圧力と外部との分圧差および気体分離選択性に促進されて気体分離膜を介して選択的に大気放出される。

【0019】（実施例3）図3は、第4の発明の実施例の空気調和機を示す。図中、24は圧縮機、25は室外熱交換器、26は絞り装置、27は液側3方弁、28は液側3方弁のネジ部、29は二酸化炭素ポンプ、30は二酸化炭素ポンプ用バルブ、31は室内熱交換器、32はガス側3方弁、33はガス側3方弁のネジ部、34は気体分離膜を具備した治具、35は治具34用バルブ、36は内外接続配管で、24～28と32、33の構成部品は室外機に内蔵されている。また、室内機は構成部

品の室内熱交換器31にて表している。

【0020】室内機と室外機を内外接続配管36にて接続し、室外機の液側3方弁27にバルブ30を介して二酸化炭素ポンペ29を取り付けた後、まず液側3方弁27のネジ部28を開いてからバルブ30を開き、内外接続配管36と室内機中に二酸化炭素を導入して内部圧力が上昇する。内圧が2～5 kg/cm²に達したと思われるところでバルブ30を閉じ、ガス側3方弁32のポート（バルブ35と気体分離膜を具備した治具34を取り付け前の状態）から内外接続配管36と室内機中の空気と二酸化炭素の混合気体を排出して大気圧状態とする。次に再度にバルブ30を開き、内外接続配管36と室内機中に二酸化炭素を導入して内圧が上昇するので内圧が2～5 kg/cm²に達したと思われるところでバルブ30を閉じ、ガス側3方弁32のポートから内外接続配管36と室内機中の空気と二酸化炭素の混合気体を排出して大気圧状態とする。この操作を3、4回繰り返すことによって内外接続配管36と室内機中はほぼ完全に二酸化炭素ガスの状態となる。そこで、バルブ30の付いた二酸化炭素ポンペ29をとともに外し、ガス側3方弁32のポートにバルブ35とともに気体分離膜を具備した治具34を取り付けた後、液側3方弁27のネジ部28を開き、室外機本体より冷媒を内外接続配管36と室内機中へと導入する。その後系内の圧力は上昇する。気体分離膜は冷媒よりも二酸化炭素を選択的に透過させる特性を有するために、室内機および接続管内の二酸化炭素は上昇した内部圧力と外部との分圧差および気体分離選択性に促進されて気体分離膜を介して選択的に大気放出される。

【0021】実施例2、3では二酸化炭素ガスを使用して、内外接続配管と室内機中の空気置換を行ったが、本発明ではその他低沸点の炭化水素ガスでも良く、たとえばメタン、エタン、プロパン、イソブタン等が使用できる。

【0022】実施例1では気体分離膜として、ポリイミド膜を、また、実施例2、3では含水ゲル膜を使用した。使用に際して特に用途限定されるものではない。しかし、優れた気体分離機能を有する膜として、本発明に適用可能なものはポリイミド膜あるいは含水ゲル膜であった。また、含水ゲル膜とは、架橋構造を有するビニルアルコール-アクリル酸塩共重合体膜であり、これにガスキャリアー水溶液を吸収させて使用するものである。また、形態としては平膜状または中空糸状の多孔質体であることが好ましい。

【0023】

【発明の効果】上記実施例から明らかなように、請求項1、2記載の発明は、室内機と室外機と両者を接続配管を用いて接続して構成する空気調和機において、据え付け工事の際に気体分離膜を具備してなる治具を取り付けた後、室外機中の冷媒ガスを室内機および接続配管中に

導入して、室内機および接続配管中の空気を気体分離膜を介して排出するもので、冷媒をほとんど大気放出することがなかった。

【0024】また、請求項3、4記載の発明は、一旦室内機および接続配管中の空気を二酸化炭素あるいは炭化水素ガスに置換した後、室外機中の冷媒ガスを室内機および接続配管中に導入して、室内機および接続配管中の置換ガスを気体分離膜を介して排出するもので、大気放出するのは冷媒よりもオゾン破壊係数、温暖化係数の小さな置換ガスに抑えられた。

【0025】また、請求項5記載の発明は、気体分離膜としてポリイミド膜あるいは含水ゲル膜を選択するものであり、優れた気体選択性が得られた。

【図面の簡単な説明】

【図1】本発明の実施例1によって行われる空気調和機の施工方法構成図

【図2】本発明の実施例2によって行われる空気調和機の施工方法構成図

【図3】本発明の実施例3によって行われる空気調和機の施工方法構成図

【符号の説明】

- 1 圧縮機
- 2 室外熱交換機
- 3 絞り装置
- 4 液側2方弁
- 5 液側2方弁のネジ部
- 6 室内熱交換機
- 7 ガス側3方弁
- 8 ガス側3方弁のネジ部
- 9 気体分離膜を具備した治具
- 10 内外接続配管
- 11 圧縮機
- 12 室外熱交換機
- 13 絞り装置
- 14 液側2方弁
- 15 液側2方弁のネジ部
- 16 室内熱交換機
- 17 ガス側3方弁
- 18 ガス側3方弁のネジ部
- 19 気体分離膜を具備した治具
- 20 バルブ
- 21 二酸化炭素ポンペ
- 22 バルブ
- 23 内外接続配管
- 24 圧縮機
- 25 室外熱交換機
- 26 絞り装置
- 27 液側3方弁
- 28 液側3方弁のネジ部
- 29 二酸化炭素ポンペ

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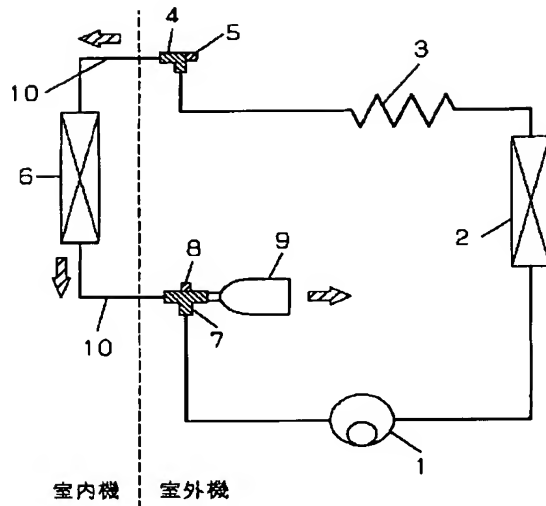
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- 7
- 30 バルブ
 - 31 室内熱交換機
 - 32 ガス側3方弁
 - 33 ガス側3方弁のネジ部

- * 34 気体分離膜を具備した治具
- 35 バルブ
- 36 内外接続配管

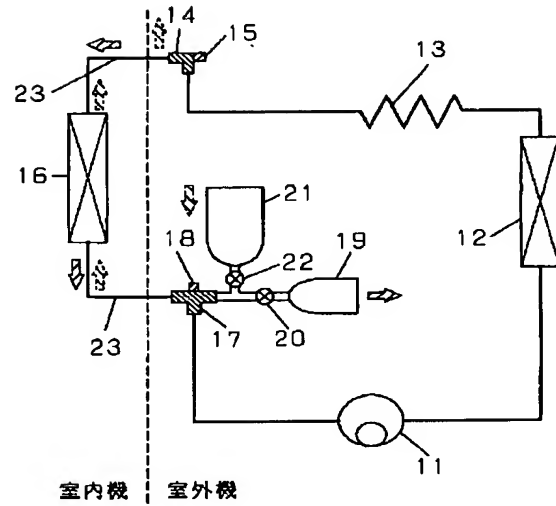
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【図1】



【図2】

実施例2



【図3】

実施例3

